

POLAR BEAR (*Ursus maritimus*): Chukchi/Bering Seas Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Polar bears are circumpolar in their distribution in the northern hemisphere. They occur in several largely discrete stocks or populations (Harington 1968). Polar bear movements are extensive and individual activity areas are enormous (Garner *et al.* 1990). The parameters used by Dizon *et al.* (1992) to classify stocks based on the phylogeographic approach were considered in the determination of stock separation in Alaska. Several polar bear stocks are known to be shared between countries (Amstrup *et al.* 1986, Amstrup and DeMaster 1988). Lentfer hypothesized that in Alaska two stocks exist, the Beaufort Sea and the Chukchi/Bering seas, based upon: (a) variations in levels of heavy metal contaminants of organ tissues (Lentfer 1976, Lentfer and Galster 1987); (b) morphological characteristics (Manning 1971, Lentfer 1974, Wilson 1976); (c) physical oceanographic features which segregate the Chukchi Sea and Bering Sea stocks from the Beaufort Sea stock (Lentfer 1974) and; (d) movement information collected from mark and recapture studies of adult female bears (Lentfer 1974, 1983, Amstrup 1995) (Fig. 1).

Past studies (Garner *et al.* 1990, Amstrup 1995) have shown that the eastern boundary of the Chukchi/Bering seas stock is near Point Barrow, and very limited movement occurs sporadically into the Beaufort Sea. The western bound of the stock is near the eastern portion of the Eastern Siberian Sea. The boundary between the Eastern Siberian Sea and the Chukchi Sea stock is designated on the basis of movements of adult female polar bears captured in the Bering and Chukchi seas region. Female polar bears initially captured and radio collared on Wrangel Island exhibited no movement into the Eastern Siberian Sea, while female polar bears captured and radio collared in the Eastern Siberian Sea, exhibited only limited short term movement into the western Chukchi Sea. The Chukchi/Bering seas stock extends into the Bering Sea and its southern boundary is determined by the annual extent of pack ice (Garner *et al.* 1990). Adult female polar bears captured in the Beaufort Sea may make seasonal movements into the Chukchi Sea in an area of overlap located between Point Barrow and Point Hope, centered near Point Lay (Garner *et al.* 1990, Garner *et al.* 1994, Amstrup 1995). Telemetry data indicate that these bears, marked in the Beaufort Sea, spend about 25% of their time in the northeastern Chukchi Sea, whereas females captured in the Chukchi Sea spend only 6% of their time in the Beaufort Sea (Amstrup 1995). Activity areas of females in the Chukchi/Bering seas (mean 244,463 km², range 144,659 - 351,369 km²) were more extensive than the Beaufort Sea (mean 162,124 km², range 9,739-269,622 km²) (Garner *et al.* 1990). Radio collared adult females spent a greater proportion of their time in the Russian region than in the American region (Garner *et al.* 1990). Historically polar bears ranged as far south as St. Matthew Island (Hanna 1920) and the Pribilof Islands (Ray 1971) in the Bering Sea.

Analysis of mitochondrial DNA indicates little differentiation of the Alaska polar bear stocks (Cronin *et al.* 1991, Scribner *et al.* 1997). Using 16 highly variable micro satellite loci, Paetkau *et al.* (1999) determined that polar bears throughout the arctic (16 populations) were very similar genetically. Genetically, polar bears in the Southern Beaufort Sea differed more from polar bears in the Chukchi/Bering Seas than from polar bears in the northern Beaufort Sea (Paetkau *et al.* 1999).

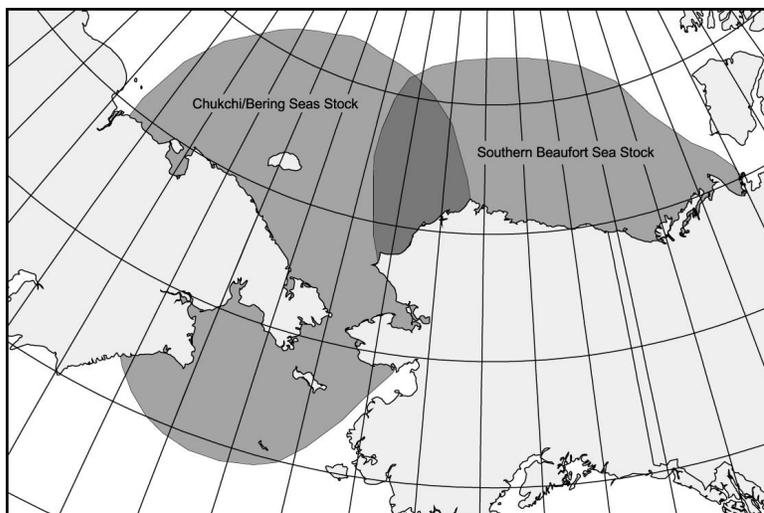


Figure 1. Approximate distribution of the Chukchi/Bering Seas polar bear stock. Dark shaded area represents distribution overlap with the Southern Beaufort Sea stock.

Past management regimes have consistently distinguished between the Southern Beaufort Sea and the Chukchi/Bering Seas stocks based on the biological evidence presented in the preceding information. The Inuvialuit of the Inuvialuit Game Council (IGC), Northwest Territories, and the Inupiat of the North Slope Borough (NSB), Alaska, polar bear management agreement for the Southern Beaufort Sea stock was delineated on stock boundaries described previously (Brower *et al.* in prep, Nageak 1991, Treseder and Carpenter 1989) and reaffirmed by the information in this stock assessment report.

POPULATION SIZE

Polar bears occur at low densities throughout their circumpolar range (DeMaster and Stirling 1981). They are long lived, mature late, have an extended breeding interval, and have small litters (Lentfer *et al.* 1980, DeMaster and Stirling 1981). Historically polar bear population size in Alaska has been difficult to estimate because of inaccessibility of the habitat, movement of bears across international boundaries, and budget limitations (Amstrup and DeMaster 1988; Garner *et al.* 1992).

Minimum Population Estimate

A reliable population estimate for the Chukchi/Bering seas population currently does not exist. Lentfer in the Administrative Law Judge (ALJ) proceeding to waive the MMPA moratorium on taking and return management to the State of Alaska (ALJ 1977) estimated that the Chukchi/Bering seas population stock (Wrangel Island to western Alaska) was 7,000 and Chapman estimated the Alaska population (both stocks) at 5,550 to 5,700 (ALJ 1977). Lentfer's and Chapman's estimates (ALJ 1977), however, were not based on rigorous statistical analysis of population data and variance estimates could not be calculated. Amstrup *et al.* (1986) estimated densities based on mark and recapture of 266 polar bears near Cape Lisburne on the Chukchi Sea, but a population estimate for the Chukchi Sea was not developed at that time. However, in 1988 Amstrup and DeMaster (1988) estimated the Alaska population (both stocks) at 3,000 to 5,000 animals based on densities calculated by Amstrup *et al.* (1986). The area that the estimate applied and the variance associated with the estimate were not provided for the 1988 population estimate (Amstrup and DeMaster 1988). A crude population estimate for the Chukchi/Bering seas stock of 1,200 to 3,200 animals was derived by subtracting the Beaufort Sea population estimate of 1,800 animals (Amstrup 1995) from the total Alaska statewide estimate, 3,000 to 5,000, (Amstrup and DeMaster 1988). The IUCN Polar Bear Specialist Group (IUCN, 1998) estimated this population to be approximately 2,000 to 5,000 based on extrapolation of multiple years of denning data for Wrangel Island, assuming a known fraction of the population dens annually as adult females. During August 2000, an aerial survey of polar bears in the Eastern Chukchi Sea was conducted by the USFWS from the U.S. Coast Guard icebreaker, Polar Star. Estimates of the density of bears inhabiting this area were developed (0.00748 bear/km², or 147 km²/bear cv. 0.38) (Evans *et al.* in prep.). A population estimate was not derived from this density since the study area included only a portion of the total area of the population. Future aerial surveys in the Russian and U.S. Chukchi Sea are being planned. Since a reliable estimate for the size of this stock is currently unavailable, a minimum population estimate (N_{min}) was not calculated.

Current Population Trend

Prior to the 20th century, when Alaska's polar bears were hunted primarily by Alaskan Natives, both stocks probably existed near carrying capacity (K). The size of the Beaufort Sea stock appeared to decline substantially in the late 1960's and early 1970's (Amstrup *et al.* 1986) due to excessive harvest rates when sport hunting was legal. Similar declines could reasonably have occurred in the Chukchi Sea, although there are no data with which to test this assumption. Since passage of the Marine Mammal Protection Act (MMPA) in 1972, harvest rates have declined and both stocks seem to have grown --- judging from (a) mark and recapture data, although recapture data are too sparse for the Chukchi stock to quantify its growth; (b) observations by Natives and residents of coastal Alaska and Russia; (c) catch per unit effort indices (Amstrup *et al.* unpublished reports); (d) reports from Russian scientists (Uspenski and Belikov 1991); (e) aerial survey observations and density estimates (Evans *et al.* in prep.) and (f) changes in the age composition of the harvest (Schliebe *et al.* 1995). The most recent analysis confirms that the Southern Beaufort Sea population experienced growth during the late 1970's and 1980's and then stabilized during the 1990's (Amstrup *et al.* 2001). Until 1992 it may have been realistic to infer that the Chukchi/Bering seas stock mimicked the growth pattern and later stability of Beaufort Sea stock, since both stocks experienced similar management and harvest histories. However, the size of the Chukchi/Being seas population has not been accurately determined and the combined effect of the ongoing Alaska harvest and the recent Chukotka harvest of an unknown number of bears can not be accurately assessed. Similarly other potential determinants

of population growth or trend, such as disease and prey availability, are not evaluated. Consequently, although there is some evidence to suggest growth for this stock in the past, the lack of current scientific information does not allow for an accurate assessment of trend.

MAXIMUM NET PRODUCTIVITY RATES

Default values for the maximum net productivity rates (R_{MAX}) for Alaska polar bear stocks were not established at the La Jolla PBR workshop (Wade and Angliss 1997). Taylor et al. (1987) estimated the maximum sustainable yield for adult female polar bears from a hunted population to be < 1.6% per annum based upon modeling. However, recent modeling efforts acknowledge that sustainable harvest rates are prone to effects from anthropogenic and natural changes as well as shortcomings in population knowledge. Issues involving global climate change and potential effects of persistent organic pollutants have also highlighted the uncertainty and risks inherent in making management decisions for polar bear populations. Population/stock specific scientific data to estimate R_{MAX} are not available for the Chukchi/Bering seas stock of polar bears. As a default, the R_{MAX} for this stock is assigned to 6.03 percent as reported for the Southern Beaufort Sea polar bear stock.

POTENTIAL BIOLOGICAL REMOVAL (PBR)

Under the 1994 re-authorized MMPA, the potential biological removal (PBR) level is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = (N_{min})(\frac{1}{2}R_{MAX})(F_R)$. Although a recovery factor of 1.0 is probably most accurate, the stock was assigned a recovery rate F_R of 0.5 following the guidelines of the PBR workshop (Wade and Angliss 1997) since the status of the population is unknown (Wade and Angliss 1997). The PBR level cannot be calculated for the Chukchi/Bering seas stock in the absence of a reliable estimate of minimum abundance. Increased efforts are necessary to estimate the size, harvest and life history data for this stock.

ANNUAL HUMAN CAUSED MORTALITY

Fisheries Information

Polar bear stocks in Alaska have no direct interaction with commercial fisheries activities.

Sport and Native Subsistence Harvest

Historically, polar bears have been killed for subsistence, handicrafts and recreation. Based upon records of skins shipped from Alaska, the estimated annual statewide harvest for 1925-53 averaged 120 bears, taken primarily by Native hunters. Recreational hunting using aircraft was common from 1951-72, increasing statewide annual harvest to 150 during 1951-60 and to 260 during 1960-72 (Amstrup *et al.* 1986; Schliebe *et al.* 1995). Aerial hunting by non-Natives was been prohibited in 1972. This reduced the mean annual harvest for both populations to 105 during 1980-2001 (SD=53; range 41-297) (USFWS unpubl. data). Figure 2 illustrates harvest rates and trend for the Chukchi/Bering seas stock from 1961-2001. From 1980-2001, harvests from the Chukchi/Bering seas stock accounted for 66% (mean=65) of the annual Alaska kill.

Recently, harvest levels by Alaska Natives from this stock have been declining. The 1996-2000 mean U.S. harvest was 44.8 bears and the sex ratio was 64M:36F (Schliebe *et al.* in prep). The number of unreported kills since 1980 to the present time is thought to be negligible based on: (a) the presence of local assistants contracted to tag parts from harvested bears; (b) active efforts to communicate the requirement for tagging harvest polar bears; (c) frequent interviews with local hunters; and (d) law enforcement

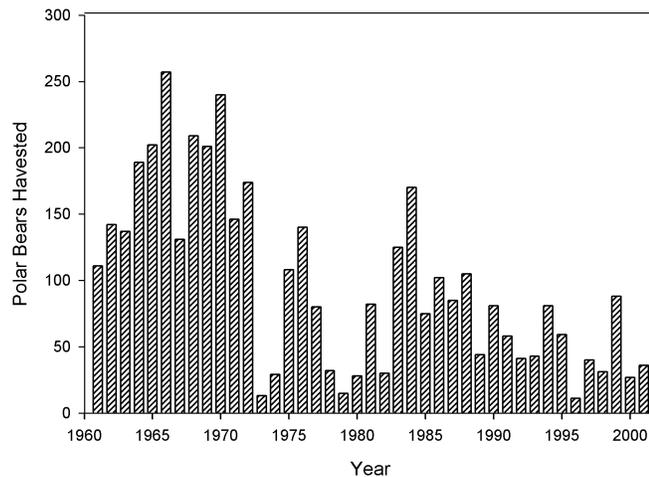


Figure 2. Annual Alaska polar bear harvest from the Chukchi/Bering seas stock, 1961-2001.

investigations. In western Alaska, presently there is no local or government control on the number of bears taken providing the population is not depleted and the taking is not wasteful. On October 16, 2000, a management agreement for this stock between the United States and Russian governments was signed. The Alaska Nanuuq Commission was instrumental in developing this agreement which identifies a central role for Native people in future implementation. Harvest guidelines and quotas are essential elements of this agreement and will be determined in the future when the US-Russia agreement is implemented.

Other Removals

Russia prohibited all hunting of polar bears in 1956 in response to perceived population declines caused by over-harvest. In Russia, only a small number of animals, less than 3-5 per year, were removed for placement in zoos prior to 1986 (Uspenski 1986) and few were taken in defense of life. No bears were taken for zoos or circuses from 1993 to 1995 (Belikov 1997). The occurrence of increased problem bear take in Chukotka was acknowledged in 1992, and Belikov (1993) estimated that up to 10 "problem" bears were killed annually in all of the Russian Arctic. Increased illegal hunting of polar bears in the Russian Arctic was also recognized to have begun in 1992, primarily in response to decentralization of management authority, entering a free market economy, and increased economic pressures. The magnitude of the illegal harvest in Russia from the Chukchi/Bering seas stock is unquantified, although anecdotal reports indicate that a substantial harvest of up to several hundred bears per year could be taking place.

In Alaska, one orphaned cub from the Chukchi/Bering seas population was placed in a zoo since 1989. In Alaska an illegal harvest, if it occurs, is so small as to be undetectable. The oil and gas industry is not active in this region within Alaska, and have not been responsible for any lethal take of polar bears.

STATUS OF STOCK

Polar bears in the Chukchi/Bering seas stock are not classified as "depleted" under the MMPA or listed as "threatened" or "endangered" under the Endangered Species Act. Reliable estimates of the minimum population, PBR level, and human-caused mortality (Chukotka) or serious injury are currently not available. The status of this stock can not be determined without better basic information on abundance and removal levels. There is a lack of information indicating that subsistence hunting in Alaska is or is not adversely affecting this population stock. No incidental loss due to any U.S. commercial fishery occurs. The status of the Chukchi/Bering seas polar bear stock is designated as uncertain due to the lack of reliable population information.

Management Actions

In the past, the shared Alaska-Chukotka polar bear population has been subject to different management strategies, and coordination of research and studies has been difficult. In the former Soviet Union hunting of polar bears was banned in 1956. Recently that level of protection has diminished due to an inability to enforce a 1956 nationwide ban on hunting polar bears. In Alaska, subsistence hunting by Natives is not restricted provided that the polar bear population is not depleted. In addition while several joint research and management projects have been successfully undertaken in the past comparable efforts are either no longer occurring, or are conducted unilaterally.

An Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Population signed by the governments of the United States and the Russian Federation on October 16, 2000, recognizes the needs of Native people to harvest polar bears for subsistence purposes and includes provisions for developing sustainable harvest limits, allocation of the harvest between jurisdictions, and compliance and enforcement. Each jurisdiction is entitled to up to one-half of a harvest limit to be determined in the future by the joint Commission. The Agreement reiterates requirements of the 1973 multi-lateral agreement and includes restrictions on harvesting denning bears, females with cubs, or cubs less than one year old, prohibitions on the use of aircraft, large motorized vessels, and snares or poison for hunting polar bears. The Agreement does not allow hunting for commercial purposes nor commercial uses of polar bears or their parts. It also commitments the Parties to the conservation of ecosystems and important habitats, with a focus on conserving specific polar bear habitats such as feeding, congregating and denning areas.

In the U.S. a number of procedural steps are required in order to give this Agreement the effect of law. The U.S. Congress must enact legislation to provide for new authorities necessary to implement the agreement. Also the U.S. Senate must ratify the agreement. In Russia the need for legislative steps, if any, to provide authorities for implementation are being determined and the mechanism to coordinate management programs with the Chukotka government and with the Chukotka Native organizations are being determined. Once U.S. legislation is enacted, a joint Commission is expected to be named and actual implementation begun.

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